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AUSTRALIA

PATENTS ACT 1990

PATENT REQUEST: STANDARD PATENT

I/We, the Applicant(s) and Nominated Person(s) specified below, request I/We be granted a patent for the invention disclosed in the accompanying standard complete specification.

[70] & [71] Applicant(s) and Nominated Person(s):

>   Siemens Ltd., incorporated in Victoria, of 544 Church Street, Richmond, Victoria, 3121, AUSTRALIA

[54] Invention: Remote Sensing of Meter Readings

[72] Inventor(s): Robert Burrett Arnold

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ASSOCIATED PROVISIONAL APPLICATION DETAILS

[31] Application No(s)	[33] Country	[32] Application Date
▇▇▇▇	AU	28 August 1990

DATED this TWENTY SECOND day of AUGUST 1991

>   Siemens Ltd.

>   By:

>   Registered Patent Attorney

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(12) PATENT ABSTRACT   (11) Document N . AU-A-82700/91
(19) AUSTRALIAN PATENT OFFICE

(54) Title
REMOTE SENSING OF METER READINGS

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(57) Claim

1.   A system for remote operation of public utility loads and/or
meters, said system comprising a central station, a plurality of widely
dispersed user locations each of which is connected through the public
telephone network to the central station, a public paging transmitter
accessible via the public telephone network, a paging receiving device at
each said user location and connected to control apparatus at said location
for the reading of a meter and/or the operation of a switch, said control
apparatus being connectable to said public telephone system at said
location following receipt of a transmitted pager signal.

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COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL

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Actual Inventor(s):	Robert Burrett Arnold
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Invention Title:	Remote Sensing of Meter Readings

ASSOCIATED PROVISIONAL APPLICATION DETAILS

[31] Application No(s)	[33] Country	[32] Application Date
PK2004	AU	28 August 1990

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

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The present invention re?---s to a system for the remote operation
of public utility loads and   ~ and finds particular application in
the remote sensing of meter   ?s of the kind used by public
utilities such as gas, elec?   and water supply authorities. In
5 addition, the system allows the loads supplied by such authorities to be
switched on and off.

Most public utilities provide their users with a metering device
which is installed at or near the point of use. Most domestic users of
gas, electricity or water supplied through a public network will be
10 familiar with the electricity meter, the gas meter or the water meter
commonly located towards the frc?t of the property. In order to charge
the users for the amount of gas, electricity or water consumed, an
officer of the appropriate publi? utility must periodically come to each
property to read the metering ?   so that the public utility can
15 determine the amount of gas, ?   ?ty or water consumed an? debit the
user accordingly.

Various prior art systems ?e known which avoid the need for an
officer of the public utility tc ?all at each location, however, for
various reasons ?ncluding excess?ve capital or communications costs,
20 these prior art systems have not found commercial acceptance.

In addition, especially in relation to electricity supply
authorities, there is a need to be able to switch various loads cn and
off. The most obvious is an off-peak water heating servi?e, however, air
conditioning units and other apparatus also fall within this category.
25 Hitherto, su?h loads have been remotely switched by means such as ripple
control pulses sent to the property over the power supply wires.

It is the object of the present invention to provide a combined
system which enables meters tc be read and/or loads to be switched on and
off and thereby enhance the flexibility and productivity of the public
30 utility.

According to a first aspect of the present invention there is
disclosed a system for remote operation of public utility loads and/or
meters, said system comprising a central station, a plurality of widely
dispersed user locations each of which is connected through the public
35 telephone network to the central station, a public paging transmitter
accessible via the public telephone network, a paging receiving device at
each said user location and connected to control apparatus at said

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location for the reading f a meter and/ r the operation of a switch,
said contr l apparatus being connectable to said public telephone system
at said location following receipt of a transmitted pager signal.

    According to a second aspect of the present invention there is
5 disclosed control apparatus for use with the abovementioned system, said
control apparatus comprising a microprocessor, a decoder connecting said
microprocessor to a paging receiving device, a telephone dialler and
modem connecting said microprocessor to said public telephone system, at
least one switch means connected to, and operable by, said
10 microprocessor, and an encoder connecting said meter and said
microprocessor.

    A preferred embodiment of the present invention will now be
described with reference to the drawings in which:

    Fig. 1 is a schematic plan of the overall system, and
15   Fig. 2 is a block diagram of the apparatus installed at each user
location in the system.

    As seen in Fig. 1, the overall system takes the form of a central
control station 1 having a CPU 2, generally in the form of a host
computer. The central control station 1 is connected by means of the
20 public telephone network 3 to each control apparatus 4 located at the
user's property. The central control station 1 is also connected via the
telephone network 3 to the transmitter 5 of a public paging system of the
type which is normally available in most large cities.

    The control apparatus 4 located at each user's property is
25 illustrated schematically in Fig. 2. The control apparatus has an aerial
10 and amplifier 11 for receipt of the transmissions from the transmitter
5 which, after amplification, are passed through a decoder 12 to a
microprocessor 13.

    The microprocessor 13 receives signals from an encoder 14 which is
30 connected to the substantially conventional meter 15 already provided by
the public supply utility. In addition, the microprocessor 13 is able to
operate various switches 16 in order to turn on loads, or turn off loads.

    Finally, the microprocessor 13 is connected to the public telephone
network 3 by means of a modem 17 and a telephone dialler 18.

35   The operation of the above described arrangement is as follows. If
the central contr l station 1 wishes to turn on a specific off-peak load,
a signal is sent from the control station 1 to the transmitter 5 and

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transmitted over the public pager network. Only the decoder 12 of the
intended control apparatus 4 responds to the coded signal transmitted
over the pager network. Acc rdingly, the corresponding microprocessor 13
is activated and receives a message instructing it to operate switch 1 of
5 the switches 16, for example.

      Alternatively, if it is intended to read the meter 15, then the
control apparatus 4 of the corresponding location is again paged, the
corresponding microprocessor 13 activated, the meter 15 read via encoder
14, and the results stored in the microprocessor 13. Then the
10 microprocessor 13 activates the telephone dialler 18 so as to connect the
particular control apparatus 4 to the central control station 1.
Following successful completion of the telephone connection, the data is
passed from the microprocessor 13 through the modem 17 to the CPU 2 at
the central control station 1. With the telephone line 2 still
15 connected, central control station 1 is able to switch any of the loads,
if desired. Then the telephone connection is broken by way of time out
(determined by the CPU 2) or a request to disconnect.

      It will be apparent to those skilled in the art that the above
described system enables remote meter reading, and also enables remote
20 switching on and off of loads. Therefore the system combines the roles
of the visiting meter reader, and the ripple control system.

      However, in addition, the system is accessible to the consumer via
the public telephone paging network. Therefore, it is also possible for
a consumer to himself control his corresponding control apparatus 4.
25 Thus, for example, two hours before leaving his office of an afternoon, a
user can send a public paging signal to his home and switch on the
control apparatus 4 at his home in order to turn on a domestic heating
system. In this way, the home is warm when the user arrives but is not
unnecessarily and wastefully heated during the day while the user is at
30 his office.

      It will be apparent to those skilled in the art that the
transmission from the transmitter 5 consists of a packet of numerical
data containing both ID numbers which identify the relevant control
apparatus 4, and command instructions to be executed at that location.
35 This packet of data is preferably checked for accuracy by the decoder 12
before the microprocessor 13 is activated.

      The preferred form of ID is a 32 bit number which therefore allows
over 4 billion combinations. By providing 10 bits in common for each

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control apparatus 4 located within a specified area. It is possible to
affect load shedding by simultaneously switching off loads at every
location within the area.

Preferably the system is realised utilizing a transmission
5 frequency of 148.637 MHz and a high priority interrupt pin is used to
enable the identified control apparatus 4 to respond to messages as
quickly as possible. This arises because in its simplest form the
control apparatus 4 has no way of buffering input data.

The foregoing describes only one embodiment of the present
10 invention and modifications, obvious to those skilled in the art, can be
made thereto without departing from the scope of the present invention.

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Th claims d fining the invention are as follows:

1.   A system for remote operation of public utility loads and/or
meters, said system comprising a central station, a plurality of widely
dispersed user locations each of which is connected through the public
telephone network to the central station, a public paging transmitter
5 accessible via the public telephone network, a paging receiving device at
each said user location and connected to control apparatus at said location
for the reading of a meter and/or the operation of a switch, said control
apparatus being connectable to said public telephone system at said
location following receipt of a transmitted pager signal.

10   2.   A system as claimed in claim 1 wherein each said control
apparatus comprises a microprocessor, and a decoder connected between said
microprocessor and said paging receiving device to decode said transmitted
pager signal for said microprocessor, said microprocessor being connected
to at least one switch means for operation of same.

15   3.   A system as claimed in claim 2 wherein said meter is connected
to said microprocessor via an encoder, the encoded output of said meter
constituting an input for said microprocessor.

4.   A system as claimed in claim 3 wherein a telephone dialler and
modem are connected between said public telephone system and said
20 controller, said telephone dialer being operable by said microprocessor to
connect same to said central station, and said modem being thereafter
operable to transmit the encoded output of said meter to said central
station.

5   A system as claimed in claim 4 wherein said modem is arranged to
25 receive switch operating instructions for said microprocessor from said
central station at the conclusion of the transmission of said encoded meter
output.

6.   A system as claimed in any one of the preceeding claims wherein
said public paging transmitter is accessible by either said central
30 station, or subscribers to said public utility, or both.

7.   A system as claimed in any one of the preceeding claims wherein
all the page receiving devices within a predetermined locality are
addressable with an address having the same prefix digit(s) whereby like
loads in said locality can by substantially simultaneously switched by
35 transmission of a common pager signal thereto.

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8. A system as claimed in any one of the preceeding claims wherein said meter is selected from the consisting of an electricity meter, a gas meter and a water meter.

9. A system f r remot on of public utility loads and/ r
5 meters, said system being subs... ...ily as herein described with reference to the accompanying drawings.

10. Control apparatus for a system as claimed in any one of claims 1 to 9 and comprising a microprocessor, a decoder connecting said microprocessor to a paging receiving device, a telephone dialler and modem
10 connecting said microprocessor to said public telephone system, at least one switch means connected to, and operable by said microprocessor, and an encoder connecting said meter and said microprocessor.

11. Control apparatus for a system as claimed in any one of claim 1 to 9, said apparatus being substar 'lly as described herein with reference
15 to Fig. 2 of the accompanying dra

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Siemens Ltd

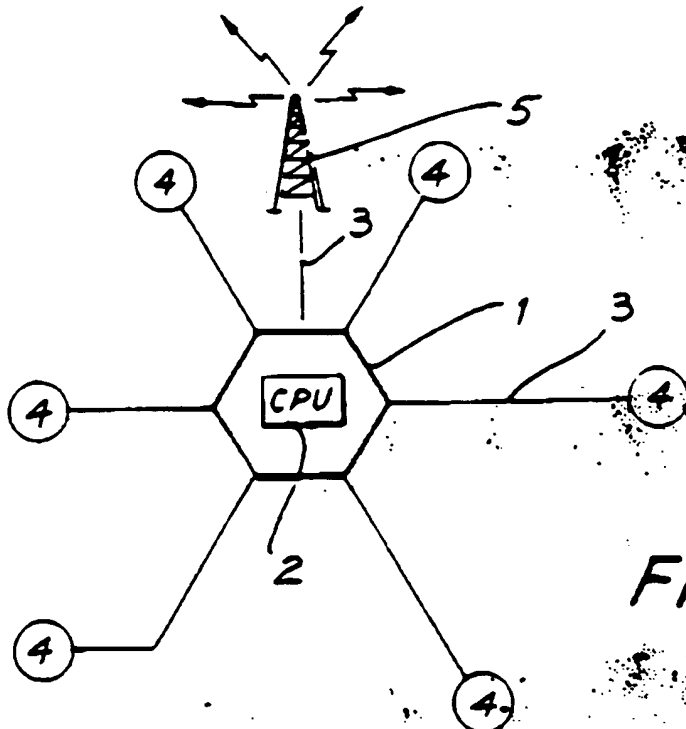Patent Attorneys f r the Applicant
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FIG.1
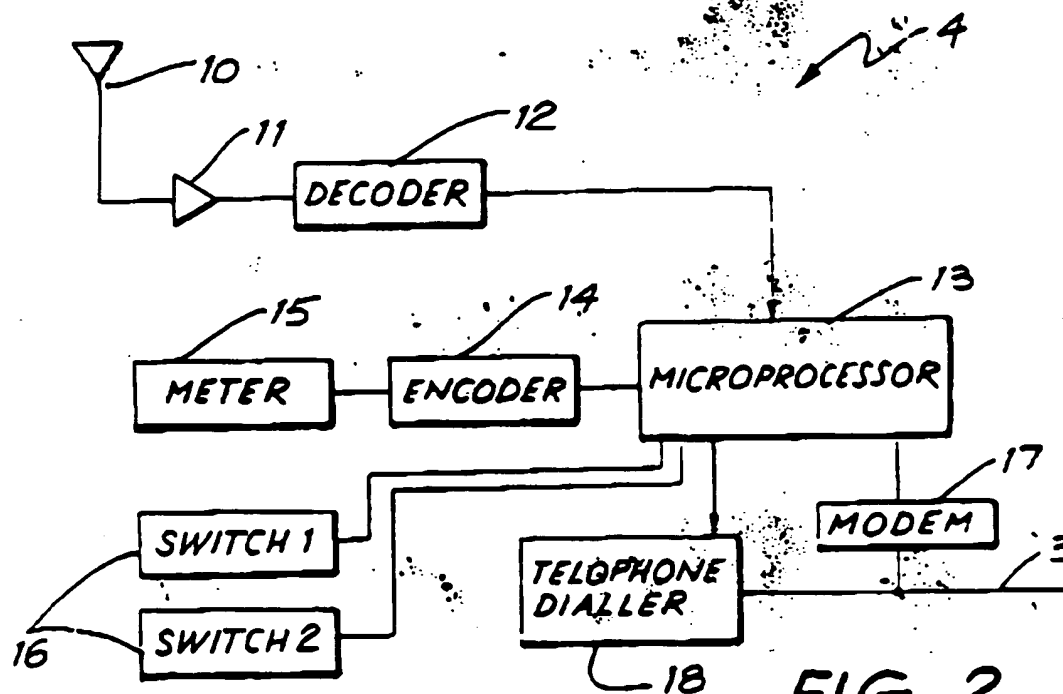

FIG. 2